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Working Party on the Transport of Dangerous Goods

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Item 6 (b) of the provisional agenda
Proposals for amendments to Annexes A and B of ADR: miscellaneous proposals

Amendments to the carrier obligations - sub-section 1.4.2.2

Transmitted by the Government of Romania[1]

Summary

Executive summary:	Clarify carrier obligations in 1.4.2.2.
Action to be taken:	To improve the carrier obligations stipulated in 1.4.2.2.
Reference documents:	Informal document INF.7 of the ninety-seventh session of the Working Party, and paragraph 43 of the report of the ninety-seventh session of ECE/TRANS/WP.15/226.

Introduction

1. The Romanian delegation analysed the requirements of 1.4.2.2 *Carrier* and is of the opinion that some aspects in the text could be improved.

[1] The present document is submitted in accordance with paragraph 1(c) of the terms of reference of the Working Party, as contained in document ECE/TRANS/WP.15/190/Add.1, which provides a mandate to "develop and update the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)".

2. During the debate of the informal document INF.7 at the last session, some of the delegations, the secretariat and the Chairman of the Working Party expressed several points of view which were integrated below.

3. The justification of the proposal was supplemented with relevant aspects regarding the enforcement procedures and regulations.

4. Our first proposal suggests a rewording of the current paragraph (g) in 1.4.2.2.1. The amendments proposed suggest replacing the terms "*written instructions*" and "*driver*" in paragraph (g) with "*ADR*" and "*vehicle crew*". The editorial amendment is consistent with the current text of section 5.4.3 because there is special equipment for each member of the vehicle crew prescribed in section 8.1.5, which is mentioned also on the last page of the instructions in writing.

5. Further on, 1.4.2.2.1 introduces the obligations of the carrier under the wording "*the carrier shall in particular*:". This binding text is essential for the description of the obligation of the carrier and we would like to propose an amendment for an increased visibility of the obligation of the carrier to provide instructions in writing to the vehicle crew. This second proposal is harmonised with the current text of RID and was supported by the majority of the delegates present at the previous session of the Working Group as mentioned in its report at paragraph 43.

6. Comparing the obligation of the carrier and of the consignor as stipulated in 1.4.2.2.1 (b) and 1.4.2.1.1 (b), we find out that they are correlated:

- 1.4.2.2.1 (b) asks the carrier to "ascertain that (...) the prescribed documentation is <u>on board of the transport unit</u>", but it is not clear enough if the instructions in writing are included in the prescribed documentation;
- 1.4.2.1.1 (b) asks the consignor to "Furnish the carrier with information and data (...), the required transport documents and accompanying documents (...);".

There are also some other obligations correlated between participants.

7. This requirement from 1.4.2.2.1 (b) probably refers to any other document than the instructions in writing. (e.g. transport documents, authorisations, approvals, notifications, certificates, etc (according to ADR 2007)). This is also the logic of the text because the instructions in writing have another regime and purpose than any other document listed before and present on board of the vehicle for the carriage of dangerous goods. This was clearly highlighted in 2009, by the new instructions which are no longer connected to a certain substance or UN number.

8. According to paragraph 1.4.2.2.6 in RID, "The carrier shall provide the driver with the instructions in writing as prescribed in <u>5.4.3</u>".

9. However, we think that, in the logic of the agreement, as Chapter 1.4 is meant to stipulate the safety obligations of the participants, 1.4.2.2 should stipulate clearly the obligation of the carrier to provide the instructions in writing to the vehicle crew also because "*the members can choose as instructions are given in the appropriate language for each one of them*". This is a main carrier's obligation and should be stated clearly in 1.4.2.2, also.

Proposal 1

10. The text of the paragraph (g) in 1.4.2.2.1 should be amended to read as follows (stricken out text is to be replaced and new text is underlined):

"ascertain that the equipment prescribed in ADR for the ~~driver~~ vehicle crew is on board the vehicle."

Proposal 2

11. Insert a new paragraph 1.4.2.2.6, as follows:

"1.4.2.2.6 The carrier shall provide the vehicle crew with the instructions in writing as prescribed in ADR."

Justification

12. Safety: Clear text improves the transport safety.

13. Feasibility: Carriers already comply with this obligation. The proposed text clarifies an existent obligation and facilitates the activity of the enforcement bodies and the vehicle crews.

14. There are no disadvantages envisaged.

15. There is no transitional period required.

16. Enforceability: The presence of a separate obligation for the carrier in this regard would facilitate the enforceability of ADR. The absence of the instructions in writing is sanctioned, e.g. in the Directive 95/50/EC on uniform procedures for checks on the transport of dangerous goods by road. The checklist in Annex I of the Directive includes the instructions in writing in the documents to be checked if they are present onboard (point 14), and the classification of infringements in Annex II includes the absence of the instruction in writing as a Risk category II infringements.

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Item 6 (b) of the provisional agenda
Proposals for amendments to annexes A and B of ADR: miscellaneous proposals

Tunnel restriction code for environmentally hazardous substances, solid and liquid (UN Nos 3077 and 3082)

Transmitted by the European Chemical Industry Council (CEFIC) and the European Council of the Paint, Printing Ink and Artists' Colours Industry (CEPE) [1]

Summary

Executive summary: Tunnel restriction code "E" is assigned to both UN 3077 (Environmentally Hazardous Substance, Solid, N.O.S.) and UN 3082 (Environmentally Hazardous Substance, Liquid, N.O.S.) in Table A of ADR. In our view both entries do not pose a significant risk to the environment in tunnels.

Action to be taken:

Reference documents:

[1] The present document is submitted in accordance with paragraph 1(c) of the terms of reference of the Working Party, as contained in document ECE/TRANS/WP.15/190/Add.1, which provides a mandate to "develop and update the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)".

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Introduction

1. Tunnel restriction code "E" is assigned to both UN 3077 (Environmentally Hazardous Substance, Solid, N.O.S.) and UN 3082 (Environmentally Hazardous Substance, Liquid, N.O.S.) in Column 15 of the Dangerous Goods List (Table A) of ADR. In our view both entries do not pose a significant risk to the environment in road tunnels.

2. According to 1.9.5.2.2 the restrictions for "Tunnel category E" apply to all dangerous goods other than UN Nos. 2919, 3291, 3331, 3359 and 3373. The risk posed by environmentally hazardous substances of UN 3077 and 3082 in tunnels is as negligible as for the other five entries. We therefore propose to add UN Nos. 3077 and 3082 to the short list of entries in Table A which are exempted from tunnel restrictions.

Proposal

3. In 1.9.5.2.2, for Tunnel category E, amend the text as follows:

"Restriction for the carriage of all dangerous goods other than UN Nos. 2919, 3077, 3082, 3291, 3331, 3359 and 3373 and for all dangerous goods in accordance with the provisions of Chapter 3.4 if the quantities carried exceed 8 tonnes total gross mass per transport unit.".

4. In section 3.2.1 "Table A: Dangerous Goods List", for UN 3077 Environmentally Hazardous Substance Solid N.O.S. and UN 3082 Environmentally Hazardous Substance Liquid, N.O.S., in Column 15 replace the Tunnel restriction code (E) by (-).

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Proposals for amendments to annexes A and B of ADR:
Miscellaneous proposals

Labelling and marking of packagings connected to an additive device in accordance with special provision 664

Transmitted by the Government of Switzerland[1]

Summary

Executive summary:	To clarify the interpretation of the marking and labelling provisions of subparagraph (g) of special provision 664 in respect of additive devices, it should be specified that packagings that may be connected to an additive device are subject to the provisions for the marking and labelling of packagings.
Action to be taken:	Add an explanatory NOTE to special provision 664, subparagraph (g).
Reference documents:	INF.14, report ECE/TRANS/WP.15/226.

Introduction

1. At the last session, the interpretation of special provision 664, subparagraph (g) was raised by Luxembourg in informal document INF.14. Paragraph 15 of report ECE/TRANS/WP.15/226 summarizes the Working Party's conclusions. However, that

[1] In accordance with the programme of work of the Inland Transport Committee for 2014–2015 (ECE/TRANS/240, para. 100 and ECE/TRANS/2014/23, module 9, para. 9.1).

clarification does not appear in the text, and interpretation is still an issue for users. They do not know whether, when applying special provision 664, subparagraph (g), it is necessary to label packagings that may be connected to the additive device or, if that is the case, which type of labelling — placards or labels — should be used.

2. Substances that may be contained as additives (UN Nos. 1202, 1993 and 3082 and non-dangerous goods) in additive devices have the same danger labels as those concerned by special provision 664 (UN Nos. 1202, 1203, 1223, 1268, 1863 and 3475). Moreover, in line with 1.2.1, the additive devices are part of the service equipment of the tanks and their content is covered by the placards on the tanks of which they are part. Since the additives should bear the same danger labels and markings as the tank itself and they are an integral part of the tank, it was not considered necessary when drafting special provision 664 to replicate in a smaller label somewhere on the tank-vehicle the information already displayed in a large label on the tank itself. That is how special provision 664 (g) should be understood.

3. The packagings mentioned in subparagraph (a) (iii) of special provision 664, however, are subject to provisions other than construction requirements (e.g. labelling and marking) as they are not part of the additive device but rather are packagings in accordance with chapter 6.1. They are subject to other provisions of ADR and are simply attached to the additive device during discharge of the tank. They should bear the labels and marking required for packagings under chapters 5.2 and 6.1.

4. For purposes of clarification, this interpretation should be specified in special provision 664, subparagraph (g).

Proposal

Add the following Note after special provision 664, subparagraph (g):

"***NOTE:*** *For the packagings described in (a) (iii) above, the relevant provisions of ADR shall apply.*"

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Item 6 (a) of the provisional agenda
Proposals for amendments to annexes A and B of ADR: construction and approval of vehicles

Use of liquefied natural gas (LNG) as fuel for vehicles carrying dangerous goods

Transmitted by the Government of Germany[1]

Summary

Executive summary: At its ninety-sixth session in May 2014, the Working Party adopted amendments to ADR that allow the use of liquefied natural gas (LNG) as fuel for vehicles carrying dangerous goods. These provisions are to enter into force on 1 January 2017.

Belgium, the Netherlands, the United Kingdom, Spain and Portugal have signed "Multilateral Agreement M276 concerning the construction of FL and OX vehicles using liquefied natural gas (LNG) as fuel for their propulsion".

The delegations that had reservations concerning these new provisions were asked to formulate their concerns.

Germany would like to inform the other ADR Contracting Parties of its concerns.

[1] In accordance with the programme of work of the Inland Transport Committee for 2014-2015 (ECE/TRANS/240, para. 100, ECE/TRANS/2014/23, cluster 9, para.9.1).

Action to be taken:	Discussion, examination whether sub-sections 9.2.4.3 and 9.2.4.4 of ADR 2017 need to be revised.
Reference documents:	ECE/TRANS/WP.15/224, paragraphs 31 to 35, ECE/TRANS/WP.15/2014/2 and related informal documents.

Introduction

1. At its ninety-sixth session in May 2014, the Working Party (WP.15) adopted some amendments to facilitate the use of LNG as fuel for FL and OX vehicles. These provisions will come into force on 1 January 2017 and are reproduced in Annex II of the report ECE/TRANS/WP.15/224.

2. It is mentioned in the report (paragraph 32):

> *"Some countries felt that more justification was required before a decision could be taken and that a scientific hazard identification study with regard to the dangerous goods carried should be conducted. The majority of countries, however, agreed that Regulation No. 110 provided a sufficiently high level of safety for the transport of dangerous goods and that the use of LNG as fuel could be allowed."*

3. Germany was one of the countries asking for a study and pointing out its concerns about the sufficiency of ECE Regulation No. 110.

4. Belgium, Netherland, United Kingdom, Spain and Portugal signed Multilateral Agreement "M276 Concerning the construction of FL and OX vehicles using liquefied natural gas (LNG) as fuel for their propulsion".

General position

5. ECE Regulation No. 110 issued by the World Forum for Harmonization of Vehicle Regulations (WP.29) provides sufficient safety for the use of LNG as fuel for passenger cars and normal freight vehicles.

6. However, Germany is of the opinion that there are more aspects which have to be taken into account, if LNG is to be allowed as fuel for special vehicles for the carriage of dangerous goods. This is not the mandate of WP.29, but that of WP.15.

7. Briefly, the points to be considered are in how far the fuel LNG might get into any interaction with the load consisting of dangerous goods not only in normal operations of the vehicle (which are not yet defined) but also in cases of incidents and accidents. This should be done from the perspective of a safe transport of dangerous goods.

Concerns in detail

8. <u>Introduction of new provisions into section 9.2.4 Prevention of fires</u>

Flammability is not the only hazard of LNG. At least the deep cold condition is likewise important.

See also standard *EN 1160:1996 Installations and equipment for liquefied natural gas – General characteristics of liquefied natural gas.*

A more sophisticated research about all hazards of LNG fuel with respect to the possible impacts for the dangerous goods loaded on the vehicle should be performed.

9. New provisions in sub-section 9.2.4.3 Fuel Tank, sub-paragraph (a)

"Normal operating conditions":

From the point of view of the Government of Germany, the insertion "in the normal operating conditions of the vehicle" does not make sense. It is to be assumed that, due to the general technical provisions applicable to motor vehicles, fuel tanks are designed so as to prevent leakage under normal operating conditions. The ADR lays down further requirements that result from the vehicle's special load consisting of dangerous goods. These requirements, here under the heading "Prevention of fire risks", apply particularly to the protection of the load and the limitation the consequences in the case of incidents and accidents.

The activation of a safety valve in the fuel system is not a leakage in the case of a damaged or perforated fuel tank.

"shall not come into contact with hot parts of the vehicle or of the load":

An amendment was made by inserting the word "of":

"shall not come into contact with hot parts of the vehicle or of the load".

It makes a difference, if the fuel shall not come into contact with "the load" (as it reads now) or with "hot parts of the load". Normally a load in a FL, OX or EX vehicle has no "hot parts". On the other hand, the fuel shall not cause the rupture of the containment of the load, i.e. the tank shell or the packages of class 1 goods.

Actively keeping the LNG fuel released during an accident or incident from a leaking fuel tank away from the vehicle or the load is only conceivable for the liquid phase. When LNG is released in normal atmospheric conditions, it quickly turns into a cryogenic gas cloud that cannot be actively kept away from the vehicle.

Main aspects to be considered are:

(a) LNG fuel tanks have a limited specific holding time before the pressure build is relieved, which must be sufficient for the maximum transport time. An operation schedule might be necessary.

(b) A defined scenario usual for incident/accident, with an upright or tilted vehicle.

(c) Effects of deep cold LNG with – 162 °C released from a damaged LNG fuel tank or system towards the tank for the load. As laid down in paragraph 6.8.2.1.8 of ADR these tanks are constructed for a temperature of – 20 °C only. Keywords: spillage, brittle fracture, Joule Thomson Effect.

(d) Have studies been carried out on the compatibility of the load of the different hazard classes that are permitted to be carried in FL, OX and EX vehicles?

(e) Fire of the vehicle (tire fire, fire in the engine), of flammable substance transported in the tank or fire around the vehicle (for example accident of other vehicles) with a release from or a serious damage of the LNG fuel tank.

- Will there be cumulative effects with a load especially, but not only, consisting of flammable or gaseous substances in the tank of the vehicle?

- Shall the emergency response forces be informed about the additional danger, that there is an LNG fuel tank on board the vehicle carrying dangerous goods?
- Is the already established fire fighting equipment (8.1.4 of ADR) sufficient, if the fuel is LNG?

(f) The load in the tank of the vehicle may be for example a corrosive liquid. If released by incident/accident, can the LNG fuel tank withstand this corrosive substance dripping on it or flowing over it? The reaction of the released dangerous goods load with the LNG fuel has to be surveyed.

(g) The load might consist of Class 2 products. Will the LNG fuel system withstand any incident with exploding gas?

(h) With regard to the discharge via or activation of the safety valves of the LNG fuel system, the question of how the discharge is to be controlled to protect the tanks and/or the load is essential. The amendments proposed for the 2017 version do not say anything in this regard. Neither does ECE Regulation No. 110.

- In the case of a potential jetfire, the cargo tank of an AT or OX vehicle or the packages on an EX vehicle might be damaged and the load might be released, catch fire or explode.
- Are the directions/settings in which the discharge is to be directed away from the vehicle and the cargo clearly defined as a standard or design specification for the vehicle?
- How can the operational safety of the safety device be ensured?
- What happens e.g. if the safety valve is jammed or blocked as a result of an accident?

ECE Regulation No. 34:

ECE Regulation No. 34 does not cover LNG as fuel.

See 4.6 of that regulation: *"Liquid fuel" means a fuel which is liquid in normal conditions of temperature and pressure.*

LNG is a cryogenic liquid.

ECE Regulation No. 110:

In ECE Regulation No. 110, according to paragraph 4.11, the LNG system includes the "tanks" and according to paragraph 4.6 "Specific Components" are among others the *"(a) Container (cylinder or tank)", "(b) Accessories fitted to the container"* and *"(j) Filling unit or receptacle"* which are deemed to be parts of the LNG fuel tank. According to paragraph 4.16 a "Container" (or cylinder) means any storage system used for compressed natural gas.

Because of that, a reference to ECE Regulation No. 110 in this subsection dealing with the "Fuel tank" is missing. An argument for this demand is the new transitional provision 1.6.5.17 of ADR, concerning the "LNG fuel system" (see also ECE/TRANS/WP.15/224, annex II).

10. New provisions in sub-section 9.2.4.4 Engine

ECE Regulation No. 110

The engine itself is not part of the *"LNG system"* according to paragraph 4.11 of ECE Regulation No. 110 and not a "*Special component*" according to the list in paragraph 4.6.

Some of the components covered by Regulation No. 110 might be included in the engine "equipment" mentioned indirectly in 9.2.4.4 of ADR. If more detailed technical requirements are specified for this engine equipment, which is more extensive in the case of an LNG fuel system, the heading of the sub-section should be amended, e.g. by adding "and fuel system".

Electronic control unit

The list in paragraph 4.6. of ECE Regulation No. 110 with the title "Specific components" also includes some electronic elements.

It could be clarified whether these elements comply with the requirements in section 9.7.8 (Electrical equipment).

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Item 6 (b) of the provisional agenda:
Miscellaneous proposals

Elimination of the tunnel restriction code for entries under UN Nos. 2814 and 2900

Transmitted by the Government of Switzerland[1]

Summary

Executive summary:	The prohibition against transporting Category A infectious substances of UN Nos. 2814 and 2900 in tunnels should be removed for consignments sent in packages, as it hinders the timely transport of analysis samples. For such substances, the risk in tunnels is more or less the same as the risk on the open road. The prohibition is not justified.
Action to be taken:	In column (15) of Table A of Chapter 3.6, replace the tunnel restriction "(E)" with "(-)" for the first entries under UN Nos. 2814 and 2900.

[1] In accordance with the programme of work of the Inland Transport Committee for 2014–2015 (ECE/TRANS/240, para. 100; ECE/TRANS/2014/23, cluster 9, para. 9.2).

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Introduction

1. The epidemic of Ebola haemorrhagic fever has been raging in several countries, and the World Health Organization (WHO) has undertaken to repatriate to Switzerland medical personnel working for United Nations agencies who are infected by the virus and who come from countries whose hospitals cannot provide the same kind of treatment as in Switzerland. This, together with a massive influx of refugees from all over the world, prompted the Swiss health authorities to assess the measures required to prevent Ebola contamination in Switzerland.

2. This assessment identified technical and administrative difficulties attributable to the ADR regulations. An example of a problem that needs to be addressed can be seen in multilateral agreement M281.

3. Substances containing the Ebola virus must be transported under the entry for UN No. 2814, assigned to Category A of Class 6.2. In Switzerland, there are just two centres equipped to carry out analyses of this virus, both located north of the Alps, in Spiez and Geneva. Some hospitals, including the one in Lugano, south of the Alps, are authorized to admit suspected Ebola patients for 72 hours. During this time, samples taken from the patient must be sent over the Alps for analysis. The heavy influx of refugees is mainly concentrated in the southern part of Switzerland. In winter, with the closing of the mountain passes, it becomes unavoidable to send the samples through the Gothard or San Bernardino tunnels, but this can only be done with a special authorization that must be justified. To respect the 72-hour deadline for deciding how to treat such patients, the administrative procedure — which must be carried out urgently — would require year-round, 24-hour staffing of the office issuing the special authorization. In light of the (hopefully) low number of cases, no administration can maintain staffing around the clock to ensure a timely response. What is more, the authorization involves costs for the hospitals. Such bureaucratic obstacles are apparently disproportionate in the light of the actual risk involved by the carriage of infectious substances in a tunnel.

4. The tunnel restrictions are based on the table in 1.1.3.6.3 of ADR, but at the outset that table was not intended to set limits for the safety of tunnels. It dates back before the introduction of tunnel restrictions and was established to define quantity limits under which a low residual risk would allow those involved in transport to benefit from some easing of the provisions of ADR. For infectious substances, transport category 0, for which no easing is possible for any quantity carried, was justified to ensure the protection of those involved in carriage, specifically the driver. It is indeed important for them to receive additional training and for the guidance regarding signage, instructions and marking to be observed.

5. With few exceptions, WP.15 has generally based its decisions in assigning transport categories on the limits set for limited quantities, under column (7a) of Table A of Chapter 3.2. Since column (7a) sets a value of 0 for substances of UN Nos. 2814 and 2900, transport category 0 was automatically selected for these entries. However, such a value is only meaningful to ensure the direct protection of those taking part in the transport. The value already existed in the regulations prior to the entry into force of the tunnel restrictions, which were added to pre-existing provisions that originally served a different purpose. As the transport category determines the quantity allowed in tunnels subject to restriction, and since the value has been set at 0 for reasons other than safety in tunnels, entries under UN Nos. 2814 and 2900 are never allowed to pass through such tunnels.

6. On the other hand, if we are addressing actual risks in tunnels, the complete prohibition of the carriage of infectious substances of Category A (UN Nos. 2814 and 2900) imposed by transport category 0 is apparently ineffective, as such substances involve the

same risk whether they are inside or outside a tunnel. For tunnels, the decision was taken to set the value at 0 without any risk analysis to back it up; it is the result of an automatic assignment of transport category 0, which was established for other purposes. There is thus no safety-related reason that justifies the complete prohibition of infectious substances in tunnels. Prior to the definitive entry into force of the tunnel prohibitions under ADR, the regulations in force in Switzerland were based on just such an analysis, and no restrictions were applied to the use of tunnels for the carriage of infectious substances in packages.

7. A look at Table A of Chapter 3.2 shows, however, that the rule cited above has not been followed in all cases. For example, there are 41 entries for which transport category 4 has been assigned. They all have been assigned a value of 0 under column (7a), but they are not subject to any tunnel restrictions. These include 31 explosive substances with classification code 1.4S under Class 1; two solid flammable substances of Class 4.1, PG III; four radioactive entries of Class 7 (UN Nos. 2908 and 2911); and four entries of Class 9 (UN Nos. 3268, 3499, 3508 and 3509).

8. If we consider the risks involved for some of the entries listed above and compare them with the fact that infectious substances involve no greater risk in tunnels than they do on the open road, we can quite rightly wonder whether it would be possible to have another classification for infectious substances in tunnels. In practice this is already the case for infectious substances of Category B.

9. There are already exemptions on tunnel prohibitions for the following UN numbers:

UN No. 2919, RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT

UN No. 3291, CLINICAL WASTE, UNSPECIFIED, N.O.S. or (BIO) MEDICAL WASTE, N.O.S. or REGULATED MEDICAL WASTE, N.O.S.

UN No. 3331, RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, FISSILE

UN No. 3359, FUMIGATED CARGO TRANSPORT UNIT

UN No. 3373, BIOLOGICAL SUBSTANCE, CATEGORY B.

Among these, UN Nos. 2919, 3291, 3331 and 3373 too have a value of 0 in column (7a).

10. It is thus possible to provide for an exemption of tunnel restrictions, even for substances with a value of 0 in column (7a) of Table A of Chapter 3, without affecting transport safety.

11. However, we do not think it is advisable to change the category assigned to infectious substances of Category A (UN Nos. 2814 and 2900) from transport category 0. If that happened, exemptions would be made to the requirement for shipping and transport personnel to receive the training they need in order to understand the hazards they face, the necessary marking of vehicles would be lost and companies would be exempted from the obligation to have safety advisers. The most appropriate solution to maintain these provisions — which after all address actual risks in tunnels and make it possible to carry infectious substances and samples in tunnels without too much bureaucratic hassle — is the one already adopted for infectious substances of Category B (infectious waste (UN No. 3291) and biological substances, Category B (UN No. 3373)). This solution consists in having no tunnel restriction code in column (15) of Table A of Chapter 3.2.

12. We thus propose replacing the tunnel restriction code "(E)" with "(-)" in Table A of Chapter 3.2, for the first entries under UN Nos. 2814 and 2900, when transported in packages.

For both these UN numbers, no similar exemption should be provided for the second entry, involving liquid nitrogen, and the third entry, covering transport in bulk containers. The system set up in ADR based on exemptions to 1.1.3.6 does not allow for a specific exemption to be made for tunnels without at the same time exempting other provisions under 1.1.3.6.2, which would for instance authorize another transport category (for instance, category 3), similar to the one for UN No. 1977. As for the case addressed by the third entries, we have no experience. Such transport in tunnels has always been subject to authorization in Switzerland, and there is apparently no need now to provide for the exemption described above.

On the other hand, tunnels have always been used without restriction for samples of the first entry under UN No. 2814. Their use meets a need which can quickly become urgent.

Proposal

For the first entry under UN Nos. 2814 and 2900 of Table A of Chapter 3.2, replace the existing tunnel restriction code "(E)" in column (15) with "(-)".

Consequential amendment: In 1.9.5.2.2, for tunnel category E, amend the text as follows:

> Restriction for all dangerous goods other than the first entries in Table A of Chapter 3.2 for UN Nos. 2814 and 2900 and UN Nos. 2919, 3291, 3331, 3359 and 3373 and for all dangerous goods in accordance with the provisions of Chapter 3.4 if the quantities carried exceed 8 tonnes total gross mass per transport unit.

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Proposals for amendments to annexes A and B of ADR: construction and approval of vehicles

Use of Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) as fuel for vehicles carrying dangerous goods

Transmitted by the European LPG Association (AEGPL) and the International Association for Natural Gas Vehicles (NGV Global)[1]

Summary

Executive summary:	Amendments to Chapter 9.2 to make the use of compressed natural gas (CNG) and liquefied petroleum gas (LPG) possible as fuel for vehicles carrying dangerous goods.
Action to be taken:	Amendment to subsections 1.6.5, 9.2.4.3, 9.2.4.4 to include CNG and LPG referencing the relevant ECE Regulations.
Reference documents:	ECE/TRANS/WP.15/2014/16 ECE/TRANS/WP.15/224 ECE/TRANS/WP.15/226, INF.23 (97th session), INF.24 (97th session)

[1] In accordance with the programme of work of the Inland Transport Committee for 2014-2015 (ECE/TRANS/240, para. 100, ECE/TRANS/2014/23, cluster 9, para.9.1).

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Introduction

1. The amending of ADR Regulations (especially Chapter 9.2) to include provisions for vehicles powered by gaseous fuels has prompted discussions for which AEGPL and NGV Global were invited to provide further justification. Based on working document ECE/TRANS/WP.15/2014/16 both organisations wish to specify the suggested amendments and address further questions raised by some delegations during the ninety-seventh session (November 2014).

2. The suggested amendments are based on proven reliable technology. There are more than 25 million vehicles worldwide running on liquefied petroleum gas (LPG) and over 21 million natural gas vehicles (NGVs), (including nearly 1.5 million heavy duty trucks and buses). Heavier vehicles fitted with compression ignition engines have been converted to operate on diesel and gaseous fuels simultaneously (referred to as dual-fuel vehicles). The United Nations regulations for LPG and compressed natural gas (CNG) components and their use on road vehicles (ECE Regulations No. 67-01 and No.110 respectively) have been in force for many years. Regulations for dual-fuel vehicles have recently been included in ECE Regulation No. 49 (heavy duty vehicles) and came into force in July 2014. LPG and natural gas (CNG and LNG) are fully legitimized fuels and fuel systems governed within a substantial body of existing United Nations regulations as well as standards and regulations adopted by many nations worldwide.

3. Concurrent with the philosophy of creating a harmonized and consistent regulatory approach to LPG and CNG, AEGPL and NGV Global advocate the specification of these market-proven fuels, fuel systems and vehicles within ADR with reference to the applicable ECE-Regulations (Nos. 67-01 and 110). Both organizations, therefore, support the notion that additional requirements regarding the specifics of dangerous goods transport that are not yet addressed by WP.29 should be included in ADR (as per Proposal 2 below). This combination of ECE-Regulations (Nos. 67-01 and 110) and the aforementioned additional requirement will provide sufficient safety provisions to justify the use of CNG and LPG as fuels for heavy goods vehicles carrying dangerous goods. AEGPL and NGV Global propose to amend the wording in ADR accordingly.

I. Properties of gaseous fuels

4. Both LPG and CNG, gaseous in their natural state under normal atmospheric conditions, exhibit good mixing qualities. Under ventilated conditions (esp. outdoors) dissipation is quick enough for this risk to be negligible in practice.

5. Both CNG and LPG are non-oxidant, non-corrosive and do not react with other chemicals.

6. Both CNG and LPG are non-toxic and apart from displacing air (risk of asphyxiation) have no harmful effects on human beings.

7. Both CNG and LPG are dangerous goods, flammable, compressed and low pressure liquefied gases, Class 2 Classification codes 1F and 2F respectively. They have been assigned the following UN Nos.: 1971 for CNG and 1965 for LPG.

8. Under prolonged exposure (several hours) LPG in its liquid phase can act as a solvent for certain materials.

9. Please refer to the accompanying technical documents that present the physical properties, safety aspects and potential hazards in more detail (Informal documents INF.23 and INF.24 submitted at the 97th session).

II. Gaseous fuel systems including fuel containers

10. The technical requirements in the existing regulations (ECE Regulations 67-01 and 110) account for the differences of the respective fuels to provide levels of safety comparable to that of liquid fuels.

11. Fuel containers for CNG and LPG are required to withstand the elevated pressures needed to store the fuels, thus inherently resist much higher puncture loads than tanks for liquid fuels.

12. The attachment of the fuel containers for CNG and LPG to the vehicle frame is required to withstand severe mechanical stresses. The fastenings are required to absorb accelerations exceeding 5.5 g.

13. Fuel containers for CNG and LPG are required to be equipped with automatically closing valves that close off the fuel flow from the container to the engine system in case of an accident when the engine stops and prevents fuel from leaking through ruptured fuel lines.

14. As no significant volume of fuel is contained in the fuel lines the release of gas is limited, considerably lowering the risk of a truck fire. As such, CNG and LPG fuel systems are at least equally robust as diesel fuel systems and are unlikely to result in substantial fuel leakage.

15. Fuel containers for CNG and LPG are designed with integral fire protection. The suitability of each fuel storage system design is certified through bon-fire tests in which the container filled to its rated capacity is exposed to a uniform fire source completely engulfing it in flames. The pressure relief valve gradually releases the pressure in a controlled manner, thereby preventing the container from bursting until no fuel is left.

16. The electrical equipment in CNG and LPG fuel systems generally is not required to comply with the provisions in their respective regulations, thus, the electrical equipment may need modification and approval according to the provisions given in section 9.2.2.

17. More in-depth evaluation of the potential hazards and technical means by which they are addressed can be found in the respective informal documents provided for CNG and LPG that support this working document (INF.23 and INF.24 submitted at the 97th session).

III. Proposals

18. The following proposed amendments are based on the new text of ADR 2017 as agreed in the May 2014 meeting (96th session) appearing in ECE/TRANS/WP.15/224 also taking into account the comments of the delegations given to AEGPL and NGV Global after the 97th session (see ECE/TRANS/WP.15/226).

19. Deletions are shown as stricken through and new text is shown in italics and underlined.

A. Proposal 1

20. Amend transitional measure 1.6.5.17 of ADR adopted at the 96th session (ECE/TRANS/224, annex II) to read as follows:

"1.6.5.17 FL and OX vehicles registered before 1 July 2017, fitted with an LNG, *CNG or LPG* fuel system, not fully in compliance with the provisions found in ECE Regulations

No. 110 and *No. 67-01 respectively*, may still be used with the approval of the competent authority of the country of registration, if an equal level of safety can be demonstrated."

B. Proposal 2

21. Amend sub-section 9.2.4.3 (as laid down in ECE/TRANS/WP.15/224, annex II) to read as follows:

"9.2.4.3 Fuel tanks and fuel containers

The fuel tanks and fuel containers supplying the engine of the vehicle shall meet the following requirements:

(a) In the event of any leakage, *under the provision that the vehicle can still be considered upright*[6], the *liquid fuel or the liquid phase of a gaseous* fuel shall *drain to the ground and* not come into contact with hot parts of the vehicle or ~~of~~ the load.;

(b) Fuel tanks for liquid fuels shall meet the requirements of ECE Regulation No. 34;, fuel containers for LNG and for CNG shall meet the relevant requirements of ECE Regulation No. 110[7]*; fuel containers for LPG shall meet the requirements of ECE Regulation No. 67-01*[8]*.*

(c) The discharge opening(s) of pressure relief devices and/or pressure relief valves shall be directed away from air intakes, fuel tanks, hot parts of the vehicle or the load.

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[6] *inclined no more than 23 ° to either side according to ECE Regulation No. 111 (Uniform provisions concerning the approval of tank vehicles of categories N and O with regard to rollover stability)*

[7] *ECE Regulation No. 110 (Uniform provisions concerning the approval of:*

I. Specific components of motor vehicles using compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion systems;

II. Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system).

[8] *ECE Regulation No. 67, as amended by the 01 series of amendments (Uniform provisions concerning the approval of:*

I. Specific equipment of vehicles of category M and N using liquefied petroleum gases in their propulsion system

II. Vehicles of category M and N fitted with specific equipment for the use of liquefied petroleum gases in their propulsion system with regard to the installation of such equipment)

C. Proposal 3

22. Amend sub-section 9.2.4.4 (as laid down in ECE/TRANS/WP.15/224, annex II) to read:

"9.2.4.4 Engine

The engine propelling the vehicle shall be so equipped and situated to avoid any danger to the load through heating or ignition. The use of *compressed natural gas (CNG) or* liquefied natural gas (LNG) as fuel shall be permitted only if the specific components for *CNG and* LNG are approved according *to* ECE Regulation No. 110[7] and their installation on the vehicle complies with the technical requirements of ECE Regulation No. 110[7]. *The use of liquefied petroleum gas (LPG) as fuel shall be permitted only if the specific components for LPG are approved according to ECE Regulation No. 67-01[8] and their installation on the vehicle complies with the technical requirements of ECE Regulation No. 67-01[8].* In the case of EX/II and EX/III vehicles the engine shall be of compression-ignition construction using only fuels with a flashpoint above 55 °C.

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[6] *inclined no more than 23° to either side according to ECE Regulation No. 111 (Uniform provisions concerning the approval of tank vehicles of categories N and O with regard to rollover stability)*

[7] *ECE Regulation No. 110 (Uniform provisions concerning the approval of:*

I. Specific components of motor vehicles using compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion systems;

II. Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system).

[8] ECE Regulation No. 67, as amended by the 01 series of amendments, (Uniform provisions concerning the approval of:

I. Specific equipment of vehicles of category M and N using liquefied petroleum gases in their propulsion system

II. Vehicles of category M and N fitted with specific equipment for the use of liquefied petroleum gases in their propulsion system with regard to the installation of such equipment)

Renumber existing footnotes accordingly.

III. Justification for proposals

A. Proposal 1

23. Vehicles using gaseous fuels (LNG, CNG and LPG) are being used for the transport of dangerous goods by Contracting Parties where they have been approved for service interpreting the current rules of ADR by the respective competent authorities. As such, transitional measures are necessary to enable continued operation of these gaseous fuelled vehicles in accordance with their current approvals.

B. Proposal 2

9.2.4.3 (a), (b) and (c)

24. The wording now used also addresses the initial intention to regulate general behaviour of the fuels in (a), and technical requirements for the tank in (b) adding (c) for requirements for further equipment related to the tank.

25. The introduction of the term "normal operating conditions" has caused some confusion, therefore, ECE Regulation No. 111 is referenced and a footnote is added to specify the angle.

26. The reference to liquid leakage was reintroduced in order to more clearly distinguish the behaviour of liquid fuels and those gaseous fuels that also can be in 'liquid phase.' Dousing the load with a liquid fuel will have a more intense effect than a gaseous fuel transitioning from its liquid to gaseous phase that might have brief contact with the load if, for example, air turbulence (wind) happens to cause some contact with the load as the gaseous fuel is dissipating into atmosphere. As such, this change seems justified in order to clarify differences in liquid and gaseous fuels that might have 'contact with the load' in the event of an accident involving a fuel leak or spill.

27. Gaseous fuels cool when decompressed (Joule-Thomson-effect). Natural gas will cool to about -20 °C but only for a very short amount of time as the gas dissipates. This poses no harm to the equipment, all of which is required to be designed to withstand -20 °C in the provisions laid down in ADR.

28. LPG, when leaking in liquid phase evaporates quickly and cools in the process. The final temperature of the liquid remaining will be defined by the ambient pressure, around -42 °C. As some materials lose ductility at lower temperatures, the chance of brittle fractures may increase. This needs to be taken into account depending on the tank material. In most cases where liquefied gases are filled into the tank, the exact same effect takes place inside the tank so the equipment needs to be designed to withstand the stresses of filling.

29. Fuel containers for gaseous fuels are by regulation tested in fire conditions where a pressure build-up could cause a rupture. The specific regulations (ECE Regulations Nos. 67-01 and 110) contain requirements and tests to type approve fuel containers to prove their fire resistance and safety. The bonfire tests specified in the respective regulations assume an engulfing pool fire. The temperature must reach a set level in a defined period of time in order to ensure the required intensity. The container is required to discharge fuel exclusively through the PRD. The test lasts until the pressure in the container has been reduced to atmospheric.

30. Fuel containers for CNG and LPG are equipped with components that are designed to withstand the heat influx of external fire. No additional measures are required for the transport of dangerous goods as fires with greater intensities than a pool fire will most probably affect the load to a greater extent than the CNG or LPG container and its equipment. A comparable level of safety for fuel containers for LPG, CNG and LNG fulfilling the requirements of ECE Regulations Nos. 67-01 or 110 is assured.

31. In case of a vehicle fire the correct orientation of the pressure relief devices (PRDs) or pressure relief valves (PRVs) shall prevent additional heat influx to the load. Although 9.2.4.3 (a) already requires liquid fuel or the liquid phase of the gaseous fuel not to come into contact "with hot parts of the vehicle or the load", directing the efflux of the PRD/PRV away from the load may be regarded as an additional level of safety.

9.2.4.4

32. The safety requirements for the fuel systems for LPG and natural gas (CNG and LNG) are elaborated in the respective ECE Regulations No. 67-01 and No. 110. Both ECE Regulations are approved by WP.29. Although these regulations do not take into account the specialties of operation in vehicles for the carriage of dangerous goods, they do address the primary safety requirements such as robustness and resilience against damage.

33. The design of the system depends on the type approval of the components themselves as well as the correct installation on the vehicle, thus guaranteeing trouble-free interaction as well as correct function.

IV. General justification

Safety:	The safety of the gaseous fuel systems has been demonstrated taking into account not only normal operating conditions but also considering the more common incidents like fires (engine, tire and load) or collisions. No additional fire extinguishing equipment is needed. Refuelling equipment for CNG and LPG has been designed to standards accommodating unsupervised operation by the ordinary driving public. The procedures have optimised for safe, quick, uncomplicated refuelling. See specifics in respective informal documents provided for each fuel.
Feasibility:	Individual Contracting Parties have already approved the operation of gaseous fuelled vehicles and have gathered extensive experience with CNG and LPG. Transporters and heavy goods vehicle manufacturers will have the option to have vehicles of this type approved for the carriage of dangerous goods.
Enforceability:	In order to guarantee the correct functioning of the system during normal operations as well as the correct functioning of the safety equipment, the installation itself should be approved by the competent authority according to the relevant ECE Regulation as well as the additional provisions made in the text of ADR.